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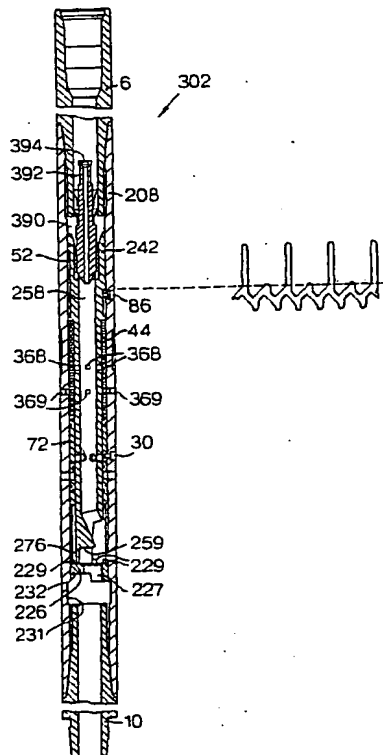
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(54) Title: MULTI-CYCLE DOWNHOLE APPARATUS



(57) Abstract: The present invention relates to downhole apparatus and particularly, but not exclusively, to multi-cycle circulating subs used during downhole drilling operations. Apparatus is provided comprising a piston (242) slidably mounted in a body between positions in which at least one aperture in the body is opened and closed. Movement of the piston (242) is controlled by a pin (86), secured to one of the body and a control member, and a control groove (52) formed in the other of the body and control member for receiving a portion of the pin. An arrangement of elements (232, 276) respectively connected to the control member and body is such as to normally resist axial movement of the control member from a first axial position to a second axial position. A spring (44) is located in a chamber for biasing the piston (242). The chamber is vented by an opening in the body.

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## INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER  
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According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 222 620 A (HALLIBURTON CO) 20 May 1987 (1987-05-20) See abstract figures 5-7	1
A	WO 97 47850 A (MCGARIAN BRUCE ;BARR LAWRENCE ROBERT (GB); RED BARON OIL TOOLS REN) 18 December 1997 (1997-12-18) figure 1	1
A	GB 2 347 443 A (CUTTING & WEAR RESISTANT DEV ;TOOLBOX DRILLING SOLUTIONS LTD (GB)) 6 September 2000 (2000-09-06) page 4, line 9 - line 28; claim 1	1
A	EP 0 994 236 A (PILOT DRILLING CONTROL LTD) 19 April 2000 (2000-04-19) claim 16; figure 11	1

☐ Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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